WHAT ARE THE UNIVERSITIES AND TECHNICAL SCHOOLS DOING TO TRAIN THEIR UNDERGRADUATES IN INDUSTRIAL RELATIONS

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THE question, "What are the universities and technical schools doing to train their undergraduates in industrial relations?" is very closely tied up with the question, "What *can* universities and technical schools do along these lines?" and a consideration of the latter question is in a measure an answer to the former. And both questions involve a consideration of the basic function of such institutions.

One of the most important developments of recent years is the popular recognition of the efficiency of engineering methods. A few years ago the word "engineering" was used almost exclusively to denote activities connected with the design, construction and operation of machinery, the construction of highways and bridges, and similar undertakings. Today we hear of "Industrial Engineering", "Efficiency Engineering", "Financial Engineering", "Human Engineering", and others of similar portent. At first sight some of these terms may seem unwarranted but they have been coined for lack of better nomenclature. They simply indicate the gradual passing of the old empirical and speculative methods of attacking the problems of industry and the steady growth of the more scientific methods that have become identified with the work of the engineer and scientist.

Not less important is the recognition of the existence of the engineering type of mind just as we have long recognized the legal type of mind. Natural talents differ, one man being well suited for the study of law and another for the study of engineering or some other calling. The engineering mind is the result of a fairly definite training of an intellect fitted for such work and the same is true of law or medicine. And it should be carefully noted that this training is fairly well defined in both quantity and content. If this were not so, it

would be possible to develop lawyers on some other basis than is now employed and doctors could no doubt be trained without studying medicine. Any course of technical study, therefore, that involves a marked weakening of the fundamentals of engineering education cannot be expected to produce men with engineering minds and this should be kept constantly in view in discussing the possibilities of the engineer in any portion of the industrial field.

Now the engineer has found an ever-increasing field of usefulness in recent years. Viewed origially as a technical adviser of industry he has been gradually drawn over into the administrative field, from the very necessities of the case. As industry has become more technical and more complex it has been found imperative to employ technically trained men to supervise industry of many kinds. And the technically trained man bringing his own peculiar methods to bear on problems of administration has already made an assured place for himself as an executive. There can be little doubt that the near future will see the engineer a dominant figure in the administrative side of industry. This must necessarily be so in a civilization such as ours which depends so largely upon engineering for its existence. As a result of these extended activities, there has grown an increasing demand from practising engineers and employers that engineering students be given some instruction in economics and such allied studies as refer to the problems of management. And hence practically all good engineering schools in this country include in their curriculum more or less instruction along these lines.

But this closer contact with the administrative side of industry has brought the engineer face to face with the greatest problem of the ages, namely, the status of the human factor in industry. Whether he wills it or not, he must face this problem and make an effort to solve it. Others have tried with little success and it remains to be seen whether the engineer with his more scientific methods of attacking industrial problems will succeed in solving this most ancient of all industrial problems.

A recognition of this further extension of the engineer's activities has brought an insistent demand that the curriculum of engineering schools be still further modified to include in-

struction and study in human relations. The demand is logical and deserves very careful consideration on the part of those who are responsible for technical education. As yet no marked modification of this kind has been made except in a few isoloted instances.

While the *character* of the modifications desirable in engineering curricula is well defined, the *degree* to which it is permissible to carry these modifications is not so obvious. Every technical school in the land is beset by urgent requests, in some cases amounting to a demand, that the course of instruction be modified to suit some peculiar industry or the opinion of some particular group of people. Financiers and bankers wish to have their particular field more fully represented. The advocates of the many forms of efficiency engineering insist upon their own peculiar modifications and those interested in uplift work are advocating complete courses in "human engineering" to replace in a large measure the courses of instruction now in use.

The tendency of the over-enthusiastic teacher is to answer these many and conflicting demands by organizing highly specialized courses of instruction that will prepare the student admirably for a definite and narrow portion of the industrial field at the expense of a broad and solid foundation for his life's work. As a consequence there are now appearing in answer to these demands some narrow and highly specialized courses of instruction such as are suggested in the foregoing. We find elaborate shop organizations for teaching the details of scientific management, so-called, and several varieties of special courses in administrative engineering; and some courses have already been established in human engineering, whatever that may be.

Now without doubt there are some places where special courses of the kinds mentioned are justifiable in the higher technical schools just as specialized trade schools are often justifiable in the lower grades of educational activity. But these special courses do not solve the general problem and there are certain grave objections to these highly specialized courses so strongly demanded by the industrial manager. It should not be forgotten that the *primary* reason why the engineer has been found useful in managerial work is his knowledge of the

fundamentals of engineering design and construction and the trained mind that he brings to the consideration of problems of management and organization. That is, aside from personal qualifications that are inherent and cannot be acquired, the technical graduate is good material from which to make an executive simply because he is primarily an engineer by training.

The character of engineering fundamentals and the amount of time that should be spent upon each one is fairly well agreed upon by educators and engineers who have given this matter careful thought. And the constant pressure that has been exerted for many years upon the technical colleges by the advocates of special training of many kinds has resulted in reducing these fundamentals to a minimum. This in itself has been a beneficial influence but it must not be extended too far. It is not claimed, of course, that the content of these fundamentals or the methods of presenting them are all that is to be desired. There is much more work to be done along these lines than some of us may be aware of. But at the most these fundamentals can only be concentrated and made more presentable; they cannot be eliminated as some would have us do and still prepare men who will possess the engineering mind. In engineering colleges that require the equivalent of a high school training at entrance it takes about three years to teach the average student the fundamentals of engineering, leaving one year in which to give him some practical applications of these fundamentals in some particular portion of engineering practice. This year of application is not necessarily the senior year, but may be spread out over one or more of the last years of college life. This amount of academic time is also available, therefore, for special instruction in economic and humanistic studies for those who wish to pursue an administrative career.

There is of course the alternative so often and so naturally advocated of lengthening the college course to five or even six years as has been done to some extent in law and other courses. A discussion of this solution is beyond the limitations of this article. This solution has been tried in several places but so far as the writer is aware there is little reason to believe that such a lengthening of the course will become universal in the near future, and there is no reason to believe that the arguments

that resulted in lengthening the course in law are fully applicable to engineering. This discussion will be confined therefore to standard four-year courses which normally send the graduate into the practical field at about twenty-three or twenty-four years of age. In general, the writer believes that this is about as late in life as a young man should begin actual service in the industrial field.

The particular problem under discussion reduces itself, therefore, to the selection of an educational content that can be incorporated into the ordinary four-year course of instruction that will give all students in the college some instruction in the fundamental principles of organization and management, some instruction in basic economic theory and as much instruction as possible in subjects dealing with human relations in industry. This content, so far as industrial organization and economic theory are concerned, is not difficult to find. Thus all engineers should receive instruction in the elementary principles of industrial organization, cost-finding etc., wage system, time and motion study and the general economics of industry. If possible, these subjects should be given before the senior year so that in the senior year the student who so desires may specialize as far along the lines of industrial organization as other students can in such lines of study as gas-engine and steam-engine design, electrical engineering etc. Space forbids a more detailed statement of such a plan but actual experience has already shown that such a course will give the student a sound engineering foundation and a good grasp on the fundamentals of economics and industrial organization and management. It will not develop specialists in this or any other line of work nor will it necessarily develop the peculiar personal qualities so often demanded by industrial managers who have peculiar managerial problems to solve.

The educational content of a course in human relations in industry is not so easy to define despite the very large amount of literature that has appeared on this subject. Of course a considerable discussion of human relations in industry is necessarily involved in any discussion of industrial management. But the entire subject of human relations is controversial, to say the least, at present, and the teacher can find little in the industrial field itself that will aid him in drawing accurate

conclusions. Certainly the average industrial manager can throw little light upon the most important matter if the results one sees in the industrial field are any indication. Of course there is a considerable literature of the "uplift" kind and there have been many experiments along the line of welfare work, so-called, which, because of their failures or successes, indicate that certain efforts may be desirable or undesirable. But a sound philosophy of what human relations in industry should be has not as yet been formulated—at least none that goes beyond a general advocacy of the Golden Rule. Perhaps all that the teacher can do is to call the attention of the student to this field and direct his thoughts to this, the greatest of all problems. This in itself is something, as it should stimulate the thoughts of these future industrial managers to think of these matters at an early age and long before the age at which most men begin to appreciate this problem. And most certainly everything possible should be done to keep the human element in industry before him and thus offset as far as possible the somewhat detached and materialistic attitude of mind that is so often found in those who concentrate their attention on pure and applied science.

It is not asserted that a training such as is outlined in the foregoing is essential for all industrial managers. We are discussing only the training of high-grade technical men who may be expected to become industrial leaders in a large way. There can be no doubt that many of the proposed courses of training that contain little or no science and engineering will be found of great value in training certain types of men. Schools of commerce have long been successful in training men for business with very little science, pure or applied, in their curriculum; and such courses modified by the introduction of a limited amount of pure and applied science should be of great value to a large number of prospective industrial workers. But such courses do not produce the engineering type of mind. They are not courses in engineering at all, but are often attempts to produce this type of mind by using other educational content and at the same time giving considerable attention to the practical aspects of industrial organization and management. If this can be done then, as previously stated, lawyers can be trained without studying much law. And those

who now so strongly advocate modifications in the engineering courses and the substitutions of large amounts of instruction in industrial relations would be the first to discover that the product of such curricula was not what they had expected.

And the industrial manager must learn that he has duties to perform which up to the present he has shirked or performed but poorly. For after the college has done all it can do for the prospective industrial worker he still is merely good material from which the industrial manager may, if he will, mold an efficient and intelligent industrial leader. The average industrial manager expects to receive from the college a full-fledged engineer or manager, while at the same time he would not think of permitting a newly-graduated doctor to remove his appendix. The technical schools should and can teach fundamentals, but the burden of adapting and specializing the graduate to fit any particular industry should rest squarely upon the shoulders of the industrial manager and of the industry where it rightly belongs. It should be said in all fairness that many progressive industrial managers have already recognized the truth of this statement as is shown by the special provisions now made by industrial concerns to adapt the college graduate to suit their specific needs. Closer cooperation is much needed along these lines.

Furthermore, these considerations are not the only ones to which the colleges must give heed. The primary object of the technical schools was to send out men who would be *useful to the industries*. Most of the technical colleges have not got far beyond this strictly utilitarian viewpoint and the demands of industry tend to keep this viewpoint constantly before them. Our national ideals, however, have changed greatly since technical colleges were first organized. A new industrial day has dawned in which profits, as such, are not the most important consideration, and industry is coming to be looked upon as a means of supporting human existence, not as a means of corporate profit. We have become more interested in men than in machines.

Industrial efficiency we must develop but the fruits of this efficiency must be for all if we adhere to our present national ideals of democracy. An efficiency that benefits the employer and not the employees, or an efficiency that builds up the state

at the expense of the individual, is foreign to these ideals. If technical graduates are to take an active part in industrial management, and it seems assured that they will, the colleges will be remiss in their duty if they do not include in their course of instruction such work as will give their students some idea of the modern views of the distribution of the fruits of industry. Here is an educational problem and an educational content to be formulated regarding which little is said in the criticism of the technical graduate, though it is one of the most important of educational problems. "Where there is no vision the people perish", said the prophet of old; and this is as true today as it was thousands of years ago. Efficient industrial managers we must have; but if the republic is to endure we also must have industrial managers whose vision will be great enough to look beyond the petty requirements often laid upon the technical school for the man who, *while useful to his industry*, can also do something to make industry *more useful to all men.*

For after all, ideals and not technical developments move the world. The recent remark of a great industrial leader that if he had his way he would put business men at the headships of our colleges and universities, shows a lamentable lack of knowledge of the principal purpose of such institutions. Technical and commercial efficiency we must have, and the problems of production must be solved. But it will avail us nothing if we cannot also solve the problem of human relations. Our business men and financiers cannot lay claim to much progress in solving this last problem. Yet it is the one great problem and one that requires not only industrial knowledge but high idealism and a love for humanity. It has been charged that the colleges and universities are too far removed from industry and the practical things of life. This may or may not be true, but it is to be sincerely hoped that there will always be in this land great institutions of learning, that are not dominated solely by industry or industrial ideas, where great teachers will have an opportunity to prepare men not only for the industrial world that now exists, but will also be free to prepare them to build a better industrial world to come.